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Capstone Project Proposal

Student Information:

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Abstract:

I will write a research paper that seeks to explore the evolution of modern-day biometric technologies from early biometry, which has its roots in eugenics, and determine whether or not modern-day biometric technologies create more harm than good in perpetuating the eugenic legacy of discriminating against already marginalized groups of people so that researchers and software developers of biometric technologies are able to develop biometric technologies that overcome their eugenic origins and benefit all people rather than discriminating against certain groups, especially people of color.

Background:

Biometry refers to the "field of development of statistical and mathematical methods applicable to data analysis problems in the biological sciences," or in layman's terms, the scientific practice of measuring all components of biological entities, most commonly human anatomy and physiology (International Biometric Society). While biometry has been around for hundreds, even thousands of years, biometry as a scientific practice began with Sir Francis Galton, also known as the father of eugenics, in the late nineteenth century. He invented the method of fingerprint mapping to distinguish people based on fingerprints, which is still in extensive use today, as well as numerous other contributions to biometrics and statistics (Ball).

Biometrics were an intrinsic element to the eugenic movement which sought to categorize and rank people based on physical traits and connect these physical traits to personality and character. Out of biometrics emerged the pseudoscience of phrenology, which asserted that "the conformation of the skull [was] indicative of mental faculties and traits of character" (Britannica). Before its postulations were disproven and dismissed as pseudoscience, phrenology enjoyed immense popularity in the twentieth century, especially amongst eugenicists who used phrenological analysis as justification for eugenic policies and supposedly proving that already marginalized groups were inherently inferior, based solely on skull size and shape alone.

In the present-day, some biometric techniques are being used just as they were in the hay day of the eugenic movement, only this time wrapped up in fancy algorithms, software, and artificial intelligence. In recent years, an increasing number of AI technologies have claimed to do exactly what the biometrics of the early twentieth century attempted to do: find associations between physical appearance and character traits. Even though these AI algorithms only reinforce pre-existing human biases, they have even more power than the misleading statistics of

the early days of biometrics to fool people into believing that there is an actual genetic correlation between personal appearance and more abstract components of a person's character, such as a predisposition to criminality. In fact, in 2016, AI researchers at Shanghai Jiao Tong University "claimed to train an algorithm to identify criminals based on the shape of their faces, with an accuracy of 89.5%. This type of technology is dangerous in that it assumes that people are born criminals, which is not the case at all, and does not account for social factors that lead a person to be convicted of a crime (Stinson).

Sources:

"Phrenology: Pseudoscientific Practice." *Britannica*, https://www.britannica.com/topic/phrenology. Accessed 24 October 2022.

Stinson, Catherine. "The Dark Past of Algorithms that Associate Appearance and Criminality." *American Scientist*, "https://www.americanscientist.org/article/the-dark-past-of-algorithms-that-associate-appearance-and-criminality. Accessed 24 October 2022.

"What is Biometry?". *International Biometric Society*, https://www.biometricsociety.org/about/what-is-biometry. Accessed 24 October 2022.

Research Questions:

1) To what extent do biometric technologies perpetuate the legacy of discriminating against already marginalized groups?
2) To what extent do the benefits of biometric technologies outweigh the drawbacks or vice-versa?

Artifact:

The artifact that I will produce by the end of the semester will be a paper.

Bibliography:

Stinson, Catherine. 2021. "The Dark Past of Algorithms that Associate Appearance and Criminality." *American Scientist*, "https://www.americanscientist.org/article/the-dark-past-of-algorithms-that-associate-appearance-and-criminality. Accessed 24 Oct 2022.

- Biometric technologies lead to a lot of false positives for already marginalized individuals, leading to denial of rights and opportunities for these groups. Some commentators argue that facial recognition should be regulated as tightly as plutonium, because it has so few non-harmful uses.
- Goes toward the research question regarding the relative benefits and drawbacks of biometric technologies

Wevers, Rosa. 2018. "Unmasking Biometrics' Biases: Facing Gender, Race, Class and Ability in Biometric Data Collection". *TMG Journal for Media History* 21 (2): 89–105. DOI: http://doi.org/10.18146/2213-7653.2018.368

- Discusses biometrics' exclusionary effects with regards to gender, race, class and ability, among others, by unveiling its historical links to nineteenth-century pseudoscientific practices

White, Dan. 2022. "Exposing the racist underpinnings of 'neutral' technology." *UC Santa Cruz Newscenter*, https://news.ucsc.edu/2022/02/ruha-benjamin-feature-mlk-coverage-dw.html. Accessed 24 Oct 2022.

- Ties together the two research questions because this source discusses the relationship amongst biometrics and machine learning technology (supposedly neutral technologies) and systemic racism and how we cannot trust the companies developing these technologies to work in the interest of marginalized groups

Outline:

i) Introduction
ii) History of biometrics and its origins and influence in the eugenics movement
iii) Discussion of how early biometrics evolved into the biometrics of today powered by artificial intelligence and machine learning algorithms
iv) Recent applications of biometric technologies
v) Weighing the pros and cons of biometric technologies based on their impact on marginalized groups
    (a) Discussion of flawed datasets
    (b) Discussion of uses even in cases where datasets are not flawed
vi) Discussion of whether biometric technologies should continue to be developed based on the previous bullet point
vii) Checks that should be put on both the development and use of biometric technologies

Schedule:

- Thursday, November 3: Compile all research on my topic, evaluate sources, take notes how I might use each source
- Thursday, November 10: Develop a working thesis and outline to help me keep a strong focus as I draft
- Thursday, November 17: First draft
- Thursday, November 24: Strong revision, getting feedback, peer review, perhaps go back and do more research if I need to
- Thursday, December 1: Editing
- Thursday, December 8: Submit Deliverable